Evolutionary Systematics. 10 2026, 55–62 | DOI 10.3897/evolsyst.10.183485

PENSOFT

EVOLUTIONARY SYSTEMATICS

Drosophilidae (Diptera) of Lagodekhi and Vashlovani Protected Areas of Georgia (Sakartvelo), with a list of Transcaucasian species

Mehrdad Parchami-Araghi[1], George Japoshvili[2,3]

1 *Canadian National Collection of Insects (CNC), Agriculture and Agri-Food Canada, 960 Carling Avenue, Ottawa, Ontario, K1A 0C6, Canada*

2 *Institute of Entomology, Agricultural University of Georgia, David Agmashenebeli Alley, #240, Tbilisi – 0159, Georgia*

3 *Invertebrate Research Center, Tetritsklebi, Telavi Municipality – 2200, Telavi, Georgia*

https://zoobank.org/3CD65BA5-F005-4998-8E6C-F1F4638BA749

Corresponding author: Mehrdad Parchami-Araghi (maraghi20@yahoo.ca)

Academic editor: Dagmara Żyła ♦ **Received** 25 December 2025 ♦ **Accepted** 21 February 2026 ♦ **Published** 10 March 2026

Abstract

A total of 407 drosophilid specimens from the Lagodekhi and Vashlovani Protected Areas are examined, for the first time, and 17 species are reported here, including two new records for Georgia [*Hirtodrosophila confusa* (Staeger) and *Lordiphosa fenestrarum* (Fallén)] and two new records from Transcaucasia [*Scaptomyza flava* (Fallén) and *Stegana* (*Steganina*) *nigrithorax* Strobl]. A list of 35 drosophilid species now known from Transcaucasia is given.

Key Words

Caucasus, Drosophilinae, fauna, small fruit flies, Steganinae, vinegar flies

Introduction

Commonly known as small fruit flies or vinegar flies, the family Drosophilidae is divided into two subfamilies Steganinae and Drosophilinae and comprises more than 4300 species within 77 genera worldwide (McEvey and Grimaldi 2021) of which at least 860 species and 34 genera occur in the Palaearctic Region (Plotnikov et al. 2013). The insect fauna of Transcaucasia was mainly recorded as part of the fauna of the former Soviet Union whose territorial disintegration in 1991 resulted in the independence of Armenia, Azerbaijan and Georgia. Prior to this study, Drosophilidae of Georgia was represented by 25 reported species, none of which were recorded from Lagodekhi or Vashlovani Protected Areas (Murvanidze et al. 2022; Japoshvili et al. 2025).

Material and methods

The studied material is the result of two separate collections that were made by the second author (GJ) from Lagodekhi (LPA) (Fig. 1A) and Vashlovani (VPA) (Fig. 1B) Protected Areas in 2014 and 2023 respectively. The specimens are deposited in the Canadian National Collection of Insects (CNC), Ottawa, Canada, however duplicate specimens will be returned to Georgia accordingly. All specimens were collected by means of Malaise traps and preserved in ethanol 96% and shipped to the CNC where they were later dehydrated, critical-point-dried (CPD), glued to pins or point mounted and finally labeled and databased. Photographs of habitus and male genitalia were taken using Leica DMC5400 color CMOS camera and Leica Application Suite X (LASX), version 3.0.8.19082.

LPA is located in the eastern part of Georgia (41.823°N, 46.272°E) close to the borders of Azerbaijan and Daghestan (Russia) where traps were set up at six different altitudes (H1–H6) from 666 to 2559 meters above sea level.

VPA is situated in the far southeastern part of the country (41.112°N, 46.646°E) close to the border of Azerbaijan. The collecting site was located in the Mijniskure camping site, on the floodplain of the Alazani River at an elevation of 97 meters above sea level.

Copyright *Mehrdad Parchami-Araghi & George Japoshvili.* This is an open access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

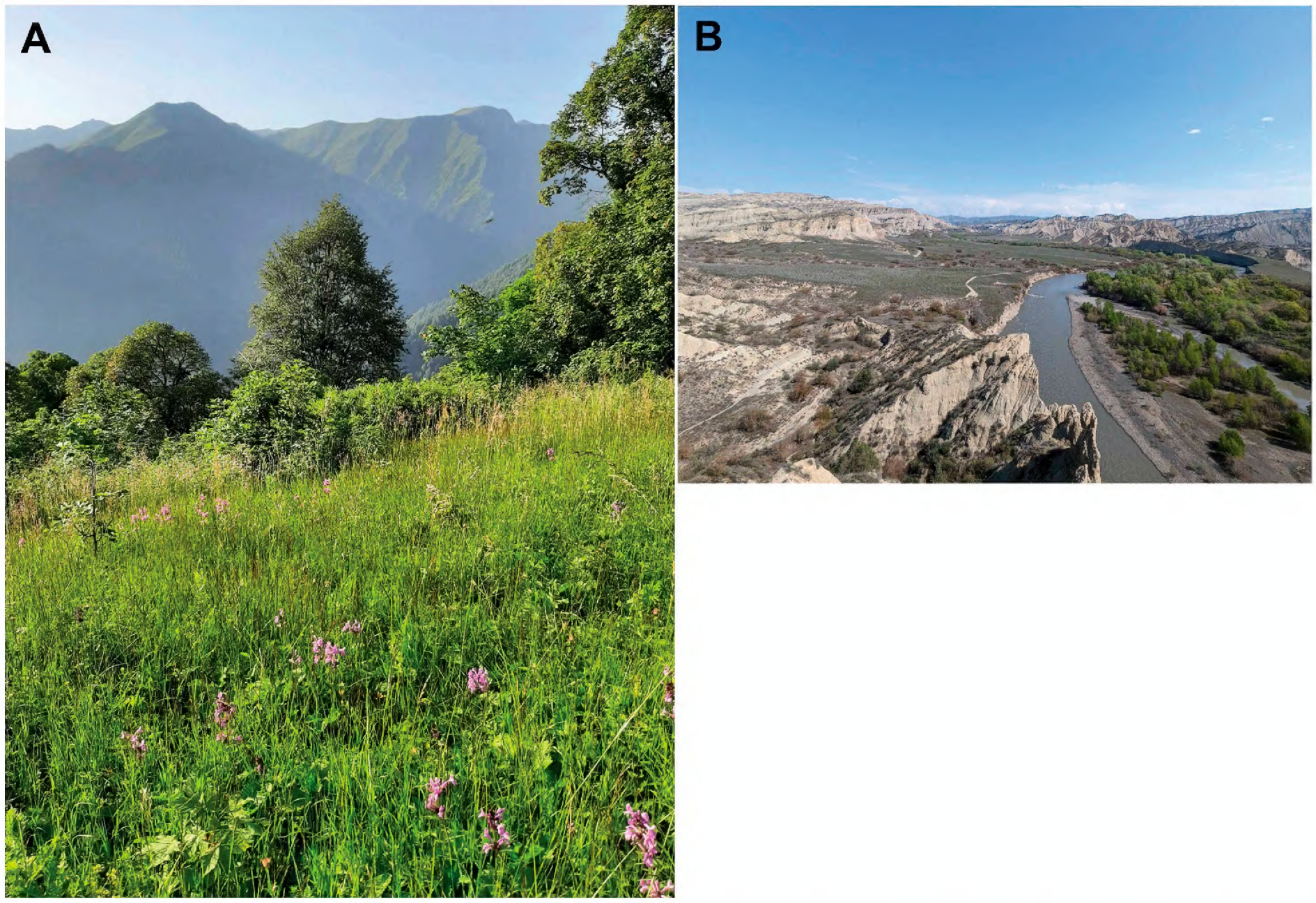

Figure 1. General views of the collecting sites in Georgia (Sakartvelo). **A.** Lagodekhi Protected Area; **B.** Vashlovani Protected Area, with the Alazani River.

In order to avoid redundancy, the examined specimens are referred here only by their CNC database numbers and the dates of collection. Full label details can be viewed at the CNC database website: https://www.cnc.agr.gc.ca/taxonomy/TaxonMain.php.

Results

The following 17 species, which are recorded here from the two protected areas for the first time, include *Hirtodrosophila confusa* (Staeger) and *Lordiphosa fenestrarum* (Fallén) as new records for Georgia and *Scaptomyza flava* (Fallén) and *Stegana nigrithorax* Strobl as new Transcaucasian species records. This research raises the number of drosophilids known from Georgia to 29 species. An updated list of 35 species of the family Drosophilidae of Transcaucasia is presented (Table 1).

Steganinae

Gitona distigma Meigen

Fig. 3B

VPA. CNC2170761♀ (5–16.v.2023).

Distribution. Known from Georgia (Murvanidze et al. 2022), Daghestan (Russia) (Imasheva et al. 1994), widely known from Europe, including Serbia, Turkey; Israel, Kazakhstan, Mongolia, north China and India (Brake and Bächli 2008).

Remarks. Commonly known as drumstick pod fly, this species is considered a pest of Moringa (*Moringa oleifera* Lamk.) in India (Math and Kotikal 2015).

Leucophenga maculata (Dufour)

LPA. CNC629800♀ (H4, 15–25.vi.2014); CNC2152002♀ (H4, 15–25.vii.2014).

VPA. CNC2170916♀ (16–24.v.2023).

Distribution. Known from Georgia (Oboňa et al. 2019), Azerbaijan (Gornostaev 1997), North Caucasus (Russia) (Gornostaev 1998), widespread in the Palaearctic Region, including Korea, Japan, in addition to Taiwan, Indonesia, Sri Lanka and Papua New Guinea (Brake and Bächli 2008).

Remarks. Females oviposit in mushrooms and males are seen to frequent dark, humid habitats (Bächli et al. 2004).

Phortica (*Phortica*) *variegata* (Fallén)

LPA. CNC473716♂ (H1, 12–13.iv.2014).

Distribution. Known from Georgia, Azerbaijan (Gornostaev 1997), Daghestan (Russia) (Imasheva et al. 1994), widespread in Europe (Brake and Bächli 2008;

Table 1. Drosophilidae of Transcaucasia.

No.	Subfamily Drosophilinae	Armenia	Azerbaijan	Georgia
1	*Drosophila* (*Dorsilopha*) *busckii* Coquillett			*
2	*Drosophila* (*Drosophila*) *funebris* (Fabricius)	*	*	*
3	*Drosophila* (*Drosophila*) *histrio* Meigen			*
4	*Drosophila* (*Drosophila*) *immigrans* Sturtevant		*	*
5	*Drosophila* (*Drosophila*) *kuntzei* Duda			*
6	*Drosophila* (*Drosophila*) *littoralis* Meigen		*	*
7	*Drosophila* (*Drosophila*) *phalerata* Meigen		*	*
8	*Drosophila* (*Drosophila*) *testacea* Roser		*	*
9	*Drosophila* (*Drosophila*) *transversa* Fallén		*	*
10	*Drosophila* (*Drosophila*) *virilis* Sturtevant	*	*	*
11	*Drosophila* (*Sophophora*) *bifasciata* Pomini		*	
12	*Drosophila* (*Sophophora*) *melanogaster* Meigen	*	*	*
13	*Drosophila* (*Sophophora*) *obscura* Fallén	*	*	*
14	*Drosophila* (*Sophophora*) *simulans* Sturtevant		*	*
15	*Drosophila* (*Sophophora*) *subobscura* Collin in Gordon		*	*
16	*Drosophila* (*Sophophora*) *suzukii* (Matsumura)		*	*
17	*Hirtodrosophila confusa* (Staeger)		*	*
18	*Hirtodrosophila trivittata* (Strobl)		*	
19	*Lordiphosa andalusiaca* (Strobl)		*	
20	*Lordiphosa fenestrarum* (Fallén)		*	*
21	*Lordiphosa hexasticha* (Papp)			*
22	*Mycodrosophila* (*Mycodrosophila*) *poecilogastra* (Loew)		*	*
23	*Scaptomyza* (*Hemiscaptomyza*) *unipunctum* (Zetterstedt)	*		
24	*Scaptomyza* (*Parascaptomyza*) *pallida* (Zetterstedt)	*		*
25	*Scaptomyza* (*Scaptomyza*) *flava* (Fallén)			*
26	*Scaptomyza* (*Scaptomyza*) *graminum* (Fallén)		*	*
27	*Zaprionus* (*Zaprionus*) *tuberculatus* Malloch		*	*
	Subfamily Steganinae			
28	*Amiota subtusradiata* Duda			*
29	*Gitona distigma* Meigen			*
30	*Leucophenga maculata* (Dufour)		*	*
31	*Phortica* (*Phortica*) *variegata* (Fallén)		*	*
32	*Stegana* (*Stegana*) *furta* (L.)		*	
33	*Stegana* (*Steganina*) *hypoleuca* Meigen			*
34	*Stegana* (*Steganina*) *nigrithorax* Strobl			*
35	*Stegana* (*Steganina*) *similis* Laštovka & Máca		*	

González et al. 2025); accidentally introduced into USA (Werner et al. 2025b) and Canada (Miller et al. 2019).

Remarks. This species is a zoophilic fly and a major vector of Thelaziasis through which the "oriental eye worm", *Thelazia callipaeda* Railliet and Henry, is transferred to their mammal hosts by lachryphagous male individuals (Otranto et al. 2006).

Stegana (*Steganina*) *hypoleuca* Meigen

LPA. CNC474257♀ (H4, 3.v.2014); CNC473463♀, CNC473691♀ (H1, 12–23.iv.2014); CNC1707329♀ (H3, 4–14.ix.2014).

VPA. CNC2189605♀ (15–25.iv.2023).

Distribution. Known from Georgia (Lake Ritsa, Apkhazeti) (Laštovka and Máca 1982), widespread in Europe (Brake and Bächli 2008).

Remark. Biology unknown.

Stegana (*Steganina*) *nigrithorax* Strobl

Fig. 3A

LPA. CNC481730♀ (H1, 4–14.vi.2014).

Distribution. Russia (Far East), Japan (Okada and Sidorenko 1992), Korea, Taiwan, Europe (Laštovka and Máca 1982; Bächli et al. 2004). New for Transcaucasia (Georgia).

Remarks. Biology unknown.

Drosophilinae

Drosophila (*Drosophila*) *funebris* (Fabricius)

VPA. CNC2189512♂ (25.iv–5.v.2023).

Distribution. Known from Georgia (including Apkhazeti) (Dubinin et al. 1937), Armenia (Dubinin et al. 1937; Arzumanyan et al. 2025), Azerbaijan (Dubinin et al. 1937;

Gornostaev 1997), Daghestan (Russia) (Imasheva et al. 1994), widespread except tropics (Brake and Bächli 2008).

Remarks. This species is a broad generalist (Werner et al. 2025a) and was bred from different decaying fruits in the UK (Atkinson and Shorrocks 1977) and from the polypore fungus *Meripilus giganteus* (Pers.) P. Karst. in Czech Republic (Roháček and Ševčík 2013).

Drosophila (*Drosophila*) *phalerata* Meigen

VPA. CNC2189705♀, CNC2189787♀, CNC2189838♀ (23.ix–13.x.2023); CNC2189671♀ (14–23.ix.2023).

Distribution. Known from Georgia and Azerbaijan (Gornostaev 1997), Daghestan (Russia) (Imasheva et al. 1994), widespread in Europe, China, Iran, Israel, Lebanon, Morocco, Siberia and Turkey (Brake and Bächli 2008).

Remarks. *Drosophila phalerata* is a fungivorous species (Bächli et al. 2004).

Drosophila (*Drosophila*) *testacea* Roser

VPA. CNC2189777♀ (23.ix–13.x.2023).

Distribution. Known from Georgia (Oboňa et al. 2019), Azerbaijan (Gornostaev 1997), Daghestan (Imasheva et al. 1994), widespread Holarctic species (Brake and Bächli 2008).

Remarks. A mushroom breeding species that has been reared on malt medium where it apparently feeds on microorganisms of the decaying fungi (Bächli et al. 2004).

Drosophila (*Drosophila*) *transversa* Fallén

LPA. CNC1707189♀ (H5, 25.vi–5.vii.2014);

VPA. CNC2170888♂ (16–24.v.2023).

Distribution. Known from Georgia (Apkhazeti) (Kuznetsova and Tyshtchenko 1979), Holarctic species (Brake and Bächli 2008).

Remarks. Its larvae feed on mushrooms (Bächli et al. 2004).

Drosophila (*Sophophora*) *melanogaster* Meigen

VPA. CNC2170986♀ (16–24.v.2023); CNC2190055♀ (3–13.vii.2023).

Distribution. Known from Georgia, Armenia and Azerbaijan (Gornostaev 1997), Daghestan (Russia) (Imasheva et al. 1994); cosmopolitan species (Brake and Bächli 2008).

Remarks. Besides its major contribution to the study of evolution and genetics, *D. melanogaster* is known as a common pest species that infests various decaying, overripe fruits and fermenting liquids.

Drosophila (*Sophophora*) *suzukii* (Matsumura)

VPA. CNC2188750♀, CNC2188753♀, CNC2188867♀ (22.vi–3.vii.2023).

Distribution. Known from Georgia (Japoshvili et al. 2018), Azerbaijan (Oboňa et al. 2019), Oriental Region, Palaearctic Region, including Europe, Iran (Parchami-Araghi et al. 2015b), North Africa, Republic of South Africa, southeast Asia, North and South America (Stacconi 2022).

Remarks. Commonly known as the Spotted Wing Drosophila, *D. suzukii* is a highly polyphagous pest, which causes economically significant damage to the fruit industry around the world (Stacconi 2022). Males are recognized by their spotted wings, as the common name suggests, while female are distinguished by their characteristic serrated ovipositor specialized in penetrating ripe fruits.

Hirtodrosophila confusa (Staeger)

Fig. 2A–E

LPA. CNC1146455♂, CNC1707104♂, CNC1707146♀ (H4, 25.v–4.vi.2014).

Distribution. Known from Azerbaijan (Gornostaev 1997) and North Caucasus (Gornostaev 1998), European and Mediterranean species (Brake and Bächli 2008). New for Georgia.

Remarks. A fungivorous species (Bächli et al. 2004).

Lordiphosa fenestrarum (Fallén)

Fig. 3C

LPA. CNC630687♂, CNC630665♂, CNC630699♀ (25.vi–5.vii.2014); CNC488084♂ (23.v–13.vi.2014).

VPA. CNC2189778♀, CNC2189730♀ (23.ix–13.x.2023).

Distribution. Azerbaijan (Oboňa et al. 2019), Daghestan (Russia) (Imasheva et al. 1994), widespread in Europe (Brake and Bächli 2008). New for Georgia.

Remarks. Adults have been trapped using fermenting beer and oak sap (Laštovka and Máca 1978) or bred from decaying cabbage (Herting 1955). Additional records of *L. fenestrarum* from Georgia (Bakuriani) are yet to be published based on the specimens deposited in the Hungarian Natural History Museum (HNHM, Budapest, Hungary) (G. Bächli, personal communication, January 27, 2026).

Mycodrosophila (*Mycodrosophila*) *poecilogastra* (Loew)

LPA. CNC1778308♂ (H1, 27.ix–6.x.2014).

Distribution. Known from Georgia and Azerbaijan (Gornostaev 1997), Daghestan (Russia) (Imasheva et al. 1994); European species, Russia (Far East) (Gornostaev

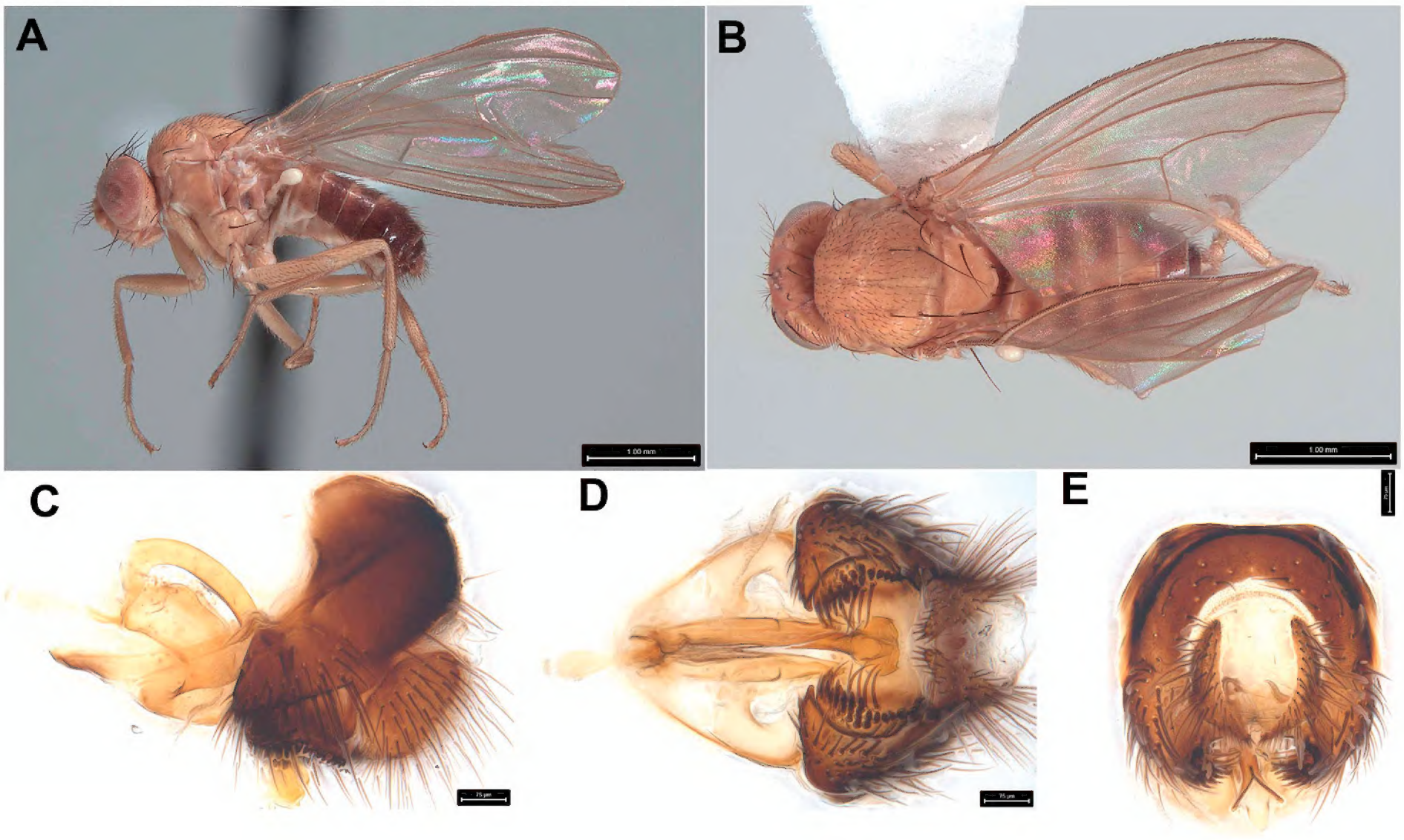

Figure 2. Male *Hirtodrosophila confusa* (Staeger). **A.** Habitus, lateral view; **B.** Habitus, dorsal view; **C.** Terminalia, lateral view; **D.** Terminalia, ventral view; **E.** Terminalia, posterior view.

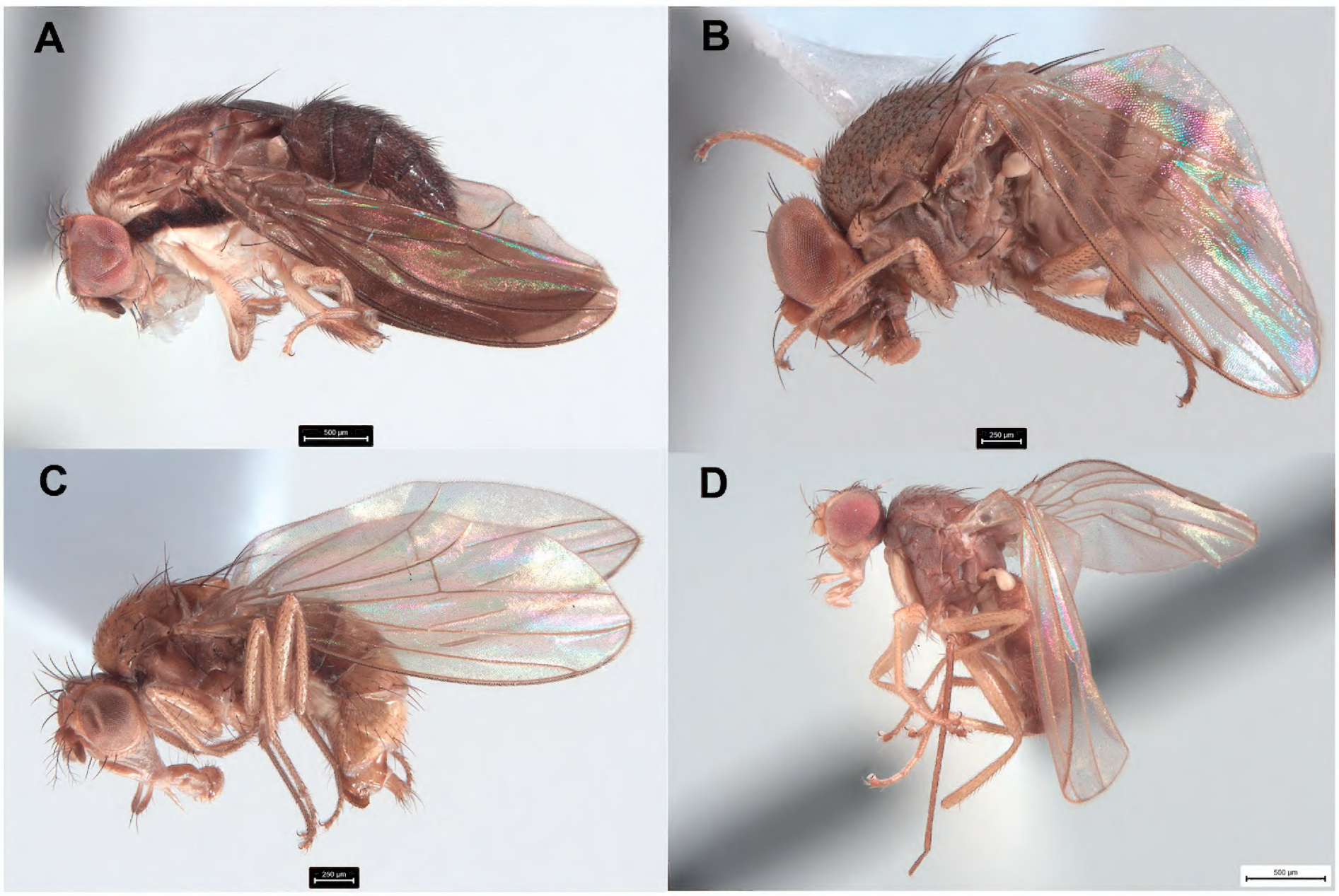

Figure 3. Habitus, lateral view. **A.** *Stegana nigrithorax* Strobl ♀; **B.** *Gitona distigma* Meigen ♀; **C.** *Lordiphosa fenestrarum* (Fallén) ♀; **D.** *Scaptomyza flava* (Fallén) ♂.

and Kulikov 2021), Ukraine, Iran to China, Korea and Japan (Brake and Bächli 2008).

Remarks. A fungivorous species (Bächli et al. 2004).

Scaptomyza (*Parascaptomyza*) *pallida* (Zetterstedt)

LPA. CNC1434150♂, CNC1434149♂, CNC799612♂, CNC473319♂, CNC473325♂, CMC474059♂, CNC799613♀, CNC473326♀, CNC474184♀, CNC473295♀ (H6, 15–25.vi.2014), CNC489600♂, CNC473059♂, CNC1879655♂, CNC473112♂, CNC473120♂, CNC473128♂, CNC473103♂, CNC489587♀, CNC473126♀, CNC472803♀, CNC472999♀, CNC473089♀, CNC472789♀, CNC473081♀, CNC473111♀, CNC630706♀, CNC473143♀, CNC489584♀ (H6, 25.vi–5.vii.2014); CNC1714068♀ (H3, 15–25.viii.2014); CNC1713479♀ (H4, 4–14.ix.2014); CNC630254♂, CNC630296♂, CNC630305♂, CNC630249♂, CNC630772♀, CNC630300♀ (H5, 25.v–4.vi.2014); CNC474417♂, CNC474389♂, CNC474347♂, CNC488078♂, CNC488116♂, CNC488045♂, CNC488089♂, CNC488044♂, CNC488087♂, CNC488040♂, CNC488038♂, CNC473216♂, CNC474366♂, CNC488127♀, CNC488083♀, CNC488130♀, CNC488046♀, CNC488042♀, CNC488062♀, CNC474429♀ (H6, 23.v–13.vi.2014); CNC487902♂, CNC487928♂, CNC487903♂, CNC487927♂, CNC487901♂, CNC487891♂, CNC487900♂, CNC487924♂, CNC487948♂, CNC487889♂, CNC487947♂, CNC487940♂, CNC487941♂, CNC487944♂, CNC487890♀, CNC487913♀, CNC487950♀, CNC487908♀, CNC487929♀, CNC487951♀, CNC487933♀, CNC487894♀, CNC481750♀, CNC487918♀, CNC487923♀, CNC487937♀, CNC487906♀ (H5, 4–14.vi.2014); CNC631325♂, CNC631369♂, CNC631356♂, CNC631367♀, CNC631302♀, CNC487972♀, CNC629992♀, CNC631320♀ (H5, 5–15.vii.2014); CNC487491♂, CNC629752♀, CNC489483♀, CNC629748♀ (H4, 5–15.v.2014); CNC629695♀ (H6, 27.ix–6.x.2014); CNC472954♂, CNC472986♂, CNC472983♂, CNC472997♀ (H1, 25.vii–5.viii.2014); CNC474228♂, CNC474231♂, CNC474230♂, CNC474234♀, CNC474288♀, CNC474262♀, CNC47413♀ (H4, 3.v.2014); CNC479587♂ (H3, 12–23.iv.2014); CNC2031775♀ (H3, 15–27.ix.2014); CNC488373♂, CNC488370♂, CNC630442♀ (H5, 2014).

VPA. CNC2171005♂, CNC2170980♂, CNC2170994♂, CNC2170997♀, CNC2189067♀, CNC2188987♀, CNC2189016♀ (16–24.v.2023); CNC2189172♂, CNC2189151♂, CNC2189224♂, CNC2167462♂, CNC2167482♂, CNC2167454♂, CNC2189272♀, CNC2167508♀ (5–16.v.2023); CNC2190081♂, CNC2190069♀ (3–13.vii.2023); CNC2189801♂, CNC2189728♀ (23.ix–13.x.2023); CNC2189630♀ (15–25.iv.2023); CNC2190324♀ (24.vii–4.viii.2023); CNC2189471♀ (25.iv–5.v.2023); CNC2190135♀ (27.v–9.vi.2023).

Distribution. Known from Georgia, Armenia (Gornostaev 1997) and Azerbaijan (Hrivniak et al. 2018), Daghestan (Russia) (Imasheva et al. 1994); cosmopolitan species (Brake and Bächli 2008).

Remarks. The larvae of *S. pallida* are frequently found on decaying plant material or as inquilines in the mines dug by other insect pests (Máca 1972) such as anthomyiid seedcorn maggot, *Delia platura* (Meigen), that was reported from the seedlings of canola, *Brassica napus* L. in Iran (Parchami-Araghi et al. 2015a).

Scaptomyza (*Scaptomyza*) *flava* (Fallén)

Fig. 3D

LPA. CNC474368♀ (H6, 23.v–13.vi.2014); CNC474258♀ (H4, 3.v.2014); CNC1146432♂ (H4, 25.v–4.vi.2014).

Distribution. Cosmopolitan species (Brake and Bächli 2008). New for Transcaucasia (Georgia).

Remarks. *Scaptomyza flava* is a leaf-miner attacking various plants, largely Brassicas (Bächli et al. 2004). Additional records of *S. flava* from Georgia (Bakuriani) are yet to be published based on the specimens deposited in the Hungarian Natural History Museum (HNHM, Budapest, Hungary) (G. Bächli, personal communication, January 27, 2026).

Scaptomyza (*Scaptomyza*) *graminum* (Fallén)

LPA. CNC1707194♂, CNC1707303♂, CNC1707288♂, CNC1707258♂, CNC1707308♂, CNC1707173♂, CNC479518♂, CNC473098♂, CNC473028♂, CNC472822♂, CNC473096♂, CNC472809♂, CNC489585♂, CNC1707253♀, CNC1707229♀, CNC1707169♀, CNC472793♀, CNC489599♀, CNC472788♀, CNC473053♀, CNC489583♀, CNC473141♀, CNC489590♀ (H5, 25.vi–5.vii.2014); CNC1713537♂, CNC1713590♂ (H3, 15–25.vii.2014); CNC1707348♀ (H3, 4–14.ix.2014); CNC474390♂, CNC474393♀ (H6, 23.v–13.vi.2014); CNC629703♂ (H6, 27.ix–6.x.2014); CNC489603♂ (H6, 25.vii–5.viii.2014); CNC488368♂, CNC488405♂, CNC488364♀, CNC488367♀ (H6, 2014); CNC472989♀, CNC472973♀, CNC473020♀ (H1, 26.vii–5.viii.2014); CNC487974♀, CNC487986♀ (5–15.vii.2014); CNC474296♀ (H4, 3.v.2014); CNC487943♀ (H5, 4–14.vi.2014).

Distribution. Known from Georgia (Oboňa et al. 2019), Azerbaijan (Gornostaev 1997) and Daghestan (Russia) (Imasheva et al. 1994); cosmopolitan species (Brake and Bächli 2008).

Remarks. Larvae are leaf-miners in the plant families Silenaceae, Chenopodiaceae, Amaranthaceae and Viciaceae (Máca 1972).

Discussion

The collection for this study was assembled solely by means of Malaise traps, therefore it is highly expected that many further species will be discovered if specifically-designed traps baited with fermenting fruit are employed. The likelihood of existence of *Chymomyza amoena* (Loew) in Georgia remains high in light of its occurrence in neighboring Daghestan (Russia) (Imasheva et al. 1994; Máca and Bächli 1994) and an unpublished observance of its presence in the outskirts of Tbilisi, the capital city of Georgia.

Acknowledgements

Funding was provided to the second author (GJ) by the Shota Rustaveli National Science Foundation of Georgia (Ref: FR/221/7-110/13 and Ref: NFR-22-1235). We are grateful to Owen Lonsdale and Jim O'Hara (CNC) for their continuous support of the project. Bradley Sinclair and Scott Brooks (CNC) kindly reviewed the manuscript and helped with producing the plate, respectively. Gerhard Bächli (Zoological Museum Winterthurerstr, Zürich, Switzerland) is thanked for his constructive comments on the manuscript.

References

Arzumanyan M, Tarzyan N, Rulik B, Pont A (2025) A preliminary checklist of the Diptera of Armenia. ZooKeys 1262: 241–288. https://doi.org/10.3897/zookeys.1262.168630

Atkinson WD, Shorrocks B (1977) Breeding site specificity in the domestic species of *Drosophila*. Oecologia 29: 223–232. https://doi.org/10.1007/bf00345697

Bächli G, Vilela CR, Anderson Escher S, Saura A (2004) The Drosophilidae (Diptera) of Fennoscandia and Denmark. Fauna Entomologica Scandinavica (Vol. 39). Brill, Leiden, 362 pp. https://doi.org/10.5281/zenodo.10734452

Brake I, Bächli G (2008) World Catalogue of Insects (Vol. 9). Drosophilidae (Diptera). Apollo Books, Stenstrup, 412 pp. https://doi.org/10.1163/9789004261037_010

Dubinin NP, Sokolov NN, Tiniakov GG (1937) Intraspecific chromosome variability. [In Russian, with the English summary]. Biologitsheskii Zhurnal 6(5–6): 1007–1054. [English translation in Comparative Cytogenetics 4(2): 207–214] https://doi.org/10.3897/compcytogen.v4i2.42

González MA, López-de-Felipe M, Magallanes S, Alarcón-Elbal PM, Barceló C, Martínez-Barciela Y, Polina A, García-López AM, Blanco-Sierra L, Peláez-Guerra M-A, Delacour S, Figuerola J, Ruiz-Arrondo I, Bravo-Barriga D (2025) Distribution, identification and ecology of *Phortica* genus (Diptera: Drosophilidae) in Spain. International Journal of Veterinary Science and Medicine 13: 1–11. https://doi.org/10.1080/23144599.2025.2453960

Gornostaev NG (1997) An addition to the fauna of drosophilid flies (Diptera, Drosophilidae) of Middle Asia, Kazakhstan and Transcaucasia. Russian Entomological Journal 5(1–4): 163–166. https://doi.org/10.5281/zenodo.10746824

Gornostaev NG (1998) Addition to the fauna of drosophilid flies (Diptera, Drosophilidae) of Russia. Russian Entomological Journal 6(1–2): 113–118. https://doi.org/10.5281/zenodo.10746827

Gornostaev NG, Kulikov AM (2021) New data on distribution of *Mycodrosophila poecilogastra* (Loew, 1874) (Diptera: Drosophilidae) in Russia. Far Eastern Entomologist 441: 11–12. https://doi.org/10.25221/fee.441.2

Herting B (1955) Untersuchungen über die Ökologie der wildlebenden *Drosophila*-Arten Westfalens. Zeitschrift für Morphologie und Ökologie der Tiere 44: 1–42. https://doi.org/10.1007/bf00390599

Hrivniak Ľ, Haenni J-P, Máca J, Oboňa J (2018) New faunistic records of flies of the families Drosophilidae and Scatopsidae (Diptera) from Azerbaijan. Klapalekiana 54: 15–16. https://doi.org/10.5281/zenodo.10749846

Imasheva AG, Lazebny OE, Cariou ML, David JR, Tsacas L (1994) Drosophilids from Daghestan (Russia) with description of a new species (Diptera). Annales de la Société entomologique de France (N.S.) 30(2): 209–216. https://doi.org/10.1080/21686351.1994.12278847

Japoshvili G, Dzneladze N, Kirkitadze G, Kiss B, Kaydan MB (2018) A new and dangerous pest for the Caucasus – *Drosophila suzukii* (Matsumura, 1931) (Diptera: Drosophilidae). Annals of Agrarian Science 16: 464–465. https://doi.org/10.1016/j.aasci.2018.05.006

Japoshvili G, Injia S, Sulamanidze G (2025) Updated annotated checklist of insects from Lagodekhi Protected Areas, Sakartvelo (Georgia). Munis Entomology & Zoology 20 (supplement): 3484–3581.

Kuznetsova IA, Tyshtchenko VP (1979) The role of photoperiod temperature in regulation of diapause termination in *Drosophila transversa* Fll. and *D. phalerata* Mg. (Diptera, Drosophilidae). [In Russian]. Entomologicheskoe Obozrenie 58: 697–704. [English translation in Entomological Review 58(4): 8–15.] https://doi.org/10.1080/07374836.1979.10523669

Laštovka P, Máca J (1978) European species of the *Drosophila* subgenus *Lordiphosa* (Diptera, Drosophilidae). Acta entomologica bohemoslovaca 75: 404–420. https://doi.org/10.5281/zenodo.10754338

Laštovka P, Máca J (1982) European and North American species of the genus *Stegana* (Diptera, Drosophilidae). Annotationes Zoologicae et Botanicae 149: 1–38. https://doi.org/10.5281/zenodo.10754342

Máca J (1972) Czechoslovak species of the genus *Scaptomyza* Hardy (Diptera, Drosophilidae) and their bionomics. Acta Entomologica Bohemoslovaca 69(2): 119–132. https://doi.org/10.5281/zenodo.10755934

Máca J, Bächli G (1994) On the distribution of *Chymomyza amoena* (Loew), a species recently introduced into Europe. Bulletin de la Société Entomologique Suisse 67: 183–188. https://doi.org/10.5281/zenodo.10755897

Math M, Kotikal YK (2015) Biology of Drumstick Pod Fly, *Gitona distigma* (Meigen). Indian Journal of Ecology 42(1): 249–250.

McEvey SF, Grimaldi DA (2021) 106. Drosophilidae (ferment flies, vinegar flies or fruit flies). In: Kirk-Spriggs AH, Sinclair BJ (Eds) Manual of Afrotropical Diptera (Vol. 3). Brachycera-Cyclorrhapha, excluding Calyptratae. Suricata 8. South African National Biodiversity Institute, Pretoria, 2295–2329.

Miller M, Hill SA, Sinclair BJ (2019) First Canadian record of the zoophilic fruit fly *Phortica variegata* (Fallén) (Diptera: Drosophilidae).

Journal of Entomological Society of Ontario 150: 31–36. https://doi.org/10.21083/jeso.v150i0.5046

Murvanidze M, Japoshvili G, Inasaridze N, Deutsch F (2022) Drosophilid flies (Diptera: Drosophilidae) of Georgia (Sakartvelo) with new records for the country. Caucasiana 1: 25–28. https://doi.org/10.3897/caucasiana.1.e87258

Oboňa J, Dvořak L, Haenni J-P, Hrivniak Ľ, Japoshvili B, Ježek J, Kerimova I, Máca J, Muranyi D, Rendoš M, Słowińska I, Snegovaya N, Stary J, Manko P (2019) New and interesting records of Diptera from Azerbaijan and Georgia. Zoosystematica Rossica 28(2): 277–295. https://doi.org/10.31610/zsr/2019.28.2.277

Okada T, Sidorenko VS (1992) New or unrecorded species of *Stegana* (*Steganina*) (Diptera, Drosophilidae) from the Old World, especially Japan and Russia. Japanese Journal of Entomology 60(2): 415–426. https://doi.org/10.5281/zenodo.10760728

Otranto D, Brianti E, Cantacessi C, Lia RP, Máca J (2006) The zoophilic fruitfly *Phortica variegata*: morphology, ecology and biological niche. Medical and Veterinary Entomology 20(4): 358–364. https://doi.org/10.1111/j.1365-2915.2006.00643.x

Parchami-Araghi M, Gilasian E, Keyhanian A-A (2015a) *Delia platura* (Meigen) (Diptera: Anthomyiidae) and *Scaptomyza pallida* (Zetterstedt) (Diptera: Drosophilidae): two new pests of canola in Iran. Studia dipterologica 22(2): 167–170.

Parchami-Araghi M, Gilasian E, Keyhanian A-A (2015b) Spotted Wing Drosophila, *Drosophila suzukii* (Matsumura) (Dip.: Drosophilidae), an invasive fruit pest new to the Middle East and Iran. Drosophila Information Service 98: 59–60.

Plotnikov IS, Sidorenko VS, Krivokhatsky VA (2013) Zoogeographic analysis of the Palaearctic fauna of drosophilid flies (Diptera, Drosophilidae) with description of clusterization software for provincial faunas. Entomological Review 93(7): 831–843. https://doi.org/10.1134/S0013873813070051

Roháček J, Ševčík J (2013) Diptera associated with sporocarps of *Meripilus giganteus* in an urban habitat. Central European Journal of Biology 8: 143–167. https://doi.org/10.2478/s11535-013-0119-z

Stacconi VR (2022) *Drosophila suzukii* (spotted wing drosophila). CABI Compendium. Wallingford, CAB International, 25 pp. https://doi.org/10.1079/cabicompendium.109283

Werner T, Steenwinkel TE, Jaenike J (2025a) The Encyclopedia of North American Drosophilids (Vol. 1): Drosophilids of the Midwest and Northeast (Version 4.0). https://digitalcommons.mtu.edu/oabooks/1/

Werner T, Steenwinkel TE, Jaenike J (2025b) The Encyclopedia of North American Drosophilids (Vol. 2): Drosophilids of the Southeast (Version 2.0). https://digitalcommons.mtu.edu/oabooks/3/